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In re Application of:

Confirmation No.: 5127

JOSEPH W. TSANG ET AL

Serial No.: 09/761,451

Group Art Unit: 1714

Filed: January 16, 2001

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For: POLYMERIC ADDITIVES TO IMPROVE PRINT QUALITY

AND PERMANENCE ATTRIBUTES IN INK-JET INKS

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Commissioner for Patents

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SECOND DECLARATION UNDER 37 CFR 1.132

Sir:

We, JOSEPH W. TSANG and JOHN R. MOFFATT, declare and state as follows:

1. We are the co-inventors named in the above-identified patent application.
2. In the specification of our patent application, we list a number of one-part, water-based polymer fixer compositions (Table IA), one-part, solvent-based polymer fixer compositions (Table IB), results of one-part, water-based fixer compositions with inks (Table IIA), and results of one-part, solvent-based fixer compositions with inks (Table IIB).

3. For comparison purposes, we prepared two-part fixer compositions, Examples 19, 20, and 21, listed in Table III below. Examples 19 and 21 bracket Example 20, and we expect the results observed with Example 20 to be similar for Examples 19 and 21.

Table III. Two-Part Fixer Compositions

		Example 19	Example 20	Example 21
Component A	Propylene glycol, MW 3000	60 %	60 %	
	Hydroxyl-terminated polyester polyol*			70 %
	glycerol	10 %	10 %	10 %
	dimethylethanolamine		3 %	
	Tetrahydrofuran	30 %	27 %	
	N-methyl pyrrolidone			20 %
Component B	Polymer MDI**	100%	100%	100%

* available from Dow Chemical as Tone 0201

** available from Dow Chemical as PAPI 2940

4. Following the same procedures as outlined in our specification, we printed ink on a variety of print media, using the two-part fixer composition listed in Example 20 above, where the ink either contained a black pigment or a water-soluble black dye. We then made a variety of measurements, again as outlined in our specification. Table IV below provides a comparison between the one-part, water-based polymer fixer composition listed as Ink Examples 9 (fixer composition Example 3 with black pigment) and 11 (fixer composition Example 3 with water-soluble black dye) in Table IIA of our specification, and the two-part fixer composition of Example 20.

Table IV. Results of One-Part Fixer Composition (Water-Based) vs
Two-Part Fixer Composition with Black Inks

	Print medium	Ink Example	Ink Example 9	Ink Example	Ink Example 11
Colorant		Black pigment	Black pigment	Water-soluble black dye	Water-soluble black dye
Fixer solution		Example 20*	Example 3**	Example 20*	Example 3**
Optical density (1)	GBND	1.44	1.45	1.32	1.31
Waterfastness (2)	GBND	0	0	0	9
	CDCY	0	2	0	6
	PMCY	1	4	2	19
Acid smearfastness (3)	GBND	0	0	1	8
	CDCY	0	0	3	5
	PMCY	2	12	2	19
Alkaline smearfastness (3)	GBND	1	7	2	15
	CDCY	1	2	1	11
	PMCY	2	20	5	25

Notes: GBND = Gilbert Bond; CDCY = Champion Datacopy; PMCY = Stora Papyrus Multi-copy.

(1) Measured in optical density units.

(2) Amount of colorant transfer by dripping deionized water onto a printed pattern, 10 minutes after printing.

(3) Amount of colorant transfer by running aqueous based highlighter twice over printed pattern. Measured in milli-optical density units.

* Example 20 (two-part fixer composition) is from Table III above.

** Example 3 (one-part water-based fixer composition) is from Table IA (specification).

5. Similar to Paragraph 4 above, we also printed ink on a variety of print media, using the two-part fixer composition listed in Example 20 above, where the ink either contained a water-

soluble cyan dye, a water-soluble magenta dye, or a water-soluble yellow dye. We then made a variety of measurements, again as outlined in our specification. Table V below provides a comparison between the one-part, solvent-based polymer fixer composition listed as Ink Examples 13 (fixer composition Example 6 with water-soluble cyan dye), 15 (fixer composition Example 6 with water-soluble magenta dye), and 17 (fixer composition 6 with water-soluble yellow dye) in Table IIB of our specification, and the two-part fixer composition of Example 20.

Table V. Results of of One-Part Fixer Composition (Solvent-Based) vs
Two-Part Fixer Composition with Color Inks

	Papers	Ink Ex- ample	Example 13	Ink Ex- ample	Example 15	Ink Ex- ample	Example 17
Colorant		Water- soluble cyan dye	Water- soluble cyan dye	Water - soluble magenta dye	Water- soluble magenta dye	Water- soluble yellow dye	Water- soluble yellow dye
Fixer solution		Example 20*	Example 6**	Example 20*	Example 6**	Example 20*	Example 6**
Optical density (1)	HFDP	1.1	1.1	1.1	1.1	1.1	1.2
	LL	1.4	1.5	1.2	1.3	1.5	1.4
	KK	1.5	1.5	1.2	1.2	1.4	1.4
	UD	1.8	1.7	1.5	1.5	1.8	1.8
	HPBF	1.9	2.0	1.4	1.5	1.7	1.8
Waterfastness (2)	HFDP	0	2	0	4	1	12
	LL	2	21	0	35	1	15
	KK	0	5	0	5	0	0
	UD	0	2	0	0	0	0
	HPBF	0	1	1	1	0	0
Alkaline smear- fastness (3)	HFDP	0	0	0	5	NM (5)	NM
	LL	0	1	0	0	NM	N.M.
	KK	0	0	0	2	NM	N.M.

	UD	0	0	0	0	NM	N.M.
	HPBF	0	0	0	1	NM	N.M.
Smudgefastness (4)	HFDP	0	5	1	8	1	2
	LL	0	0	3	12	1	18
	KK	1	2	0	5	0	0
	UD	0	2	0	18	0	0
	HPBF	0	1	0	1	0	0

Notes: HFDP = Hammermill Fore DP; LL = SpectraTech Lustro Laser (Warren); KK = Kromekote 2000 IS cover (Champion); UD = Utopia Dull (Appleton); HPBF = Hewlett-Packard Professional Brochure and Flyer paper.

(1) Measured in optical density units.

(2) Amount of colorant transfer by dripping deionized water onto a printed pattern, 10 minutes after printing.

(3) Amount of colorant transfer by running aqueous-based highlighter twice over printed pattern. Measured in milli-optical density units.

(4) Amount of colorant transfer by dripping deionized water onto a printed pattern 10 minutes after printing, followed immediately by running a finger over the wetted area.

(5) n.m. = not meaningful.

* Example 20 (two-part fixer composition) is from Table III above.

** Example 6 (one-part solvent-based fixer composition) is from Table IB (specification).

6. In both comparison tests, the two-part fixer was printed as follows: an overcoating on a printed sample was formed by first depositing a solution of Component A and followed immediately by Component B. The functionality equivalent of hydroxyl groups in Component A used was 50% in excess relative to the isocyanate groups in Component B. Film formation occurred quickly as the polymerization took place. After 10 minutes, the print quality attributes were measured, as listed in Tables IV and V above.

7. A review of the data shows that, in general, the two-component fixer system provides results that are at least equivalent, and in many cases superior, to the one-component fixer system:

7a. Colorant = Black Pigment. With regard to the one-component, water-based fixer, the two-component system is seen to be superior in waterfastness on CDCY and PMCY media, superior in acid smearfastness on PMCY media, and superior in alkaline smearfastness on all three media (GBND, CDCY, PMCY). In the remaining cases tested, namely, the waterfastness (GBND) and acid smearfastness (GBND, CDCY), the results were essentially equivalent.

7b. Colorant = Water-Soluble Black Dye. With regard to the one-component, water-based fixer system, the two-component system is seen to be superior in all three tests (waterfastness, acid smearfastness, alkaline smearfastness) on all three print media (GBND, CDCY, PMCY).

7c. Colorant = Water-Soluble Cyan Dye. With regard to the one-component, solvent-based fixer system, the two-component system is seen to be superior in waterfastness on all five print media (HFDP, LL, KK, UD, HPBF), superior in alkaline smearfastness on one print media (LL), and superior in smudgefastness on four print media (HFDP, KK, UD, HPBF). In the remaining cases tested, namely, the alkaline smearfastness (HFDP, KK, UD, HPBF) and smudgefastness (LL), the results were essentially equivalent.

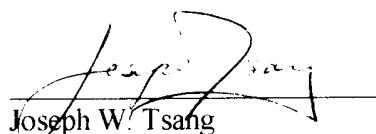
7d. Colorant = Water-Soluble Magenta Dye. With regard to the one-component, solvent-based fixer system, the two-component system is seen to be superior in waterfastness on three print media (HFDP, LL, KK), superior in alkaline smearfastness on three print media (HFDP, KK, HPBF), and superior in smudgefastness on all five print media (HFDP, LL, KK, UD, HPBF). In the remaining cases tested, namely, the waterfastness (UD, HPBF) and alkaline smearfastness (LL, UD), the results were essentially equivalent.

7e. Colorant = Water-Soluble Yellow Dye. With regard to the one-component, solvent-based fixer system, the two-component system is seen to be superior in waterfastness on two print media (HFDP, LL) and superior in smudgefastness on two print media (HFDP, LL). In the remaining cases tested, namely, the waterfastness (KK, UD, HPBF) and smudgefastness (KK, UD, HPBF), the results were essentially equivalent. The alkaline smearfastness is not meaningful for the water-soluble yellow dye, since the highlighter itself is yellow, and thus the yellow colorant transfer cannot be measured accurately.

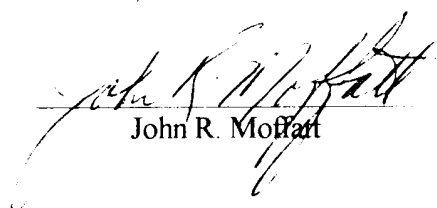
8. We also observed faster film formation on paper for the two-component fixer system, compared to the one-component fixer system.

We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Dated: Sept 5, 2003


Joseph W. Tsang

Dated: Sept 5, 2003


John R. Moffatt